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Effectiveness of Information Communication Technology on Education in Kenyan Universities

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Information and Communication Technology (ICT) has been growing faster and having influence in society and daily life. It has been a vital instrument in giving higher education to the people. Integration of ICT assisted lectures to the global requirement to replace traditional lecturing methods with a technology-based lecturing and learning tools and facilities. ICT has a major role in giving access to information. Its application and having skills, knowledge and expertise was very critical. In the 21st century, the issue of ICT has made the level of education escalate in our Kenyan Universities. ICT has been considered as one of the main elements in transforming the country to the future development. Educational Sustainable development was the development that met the education needs of the present without compromising the ability of future generations. As examples of Sustainable Development Goals (SDGs), there was need to improve education status within our country. The study aimed to evaluate the effectiveness of ICT in universities of Kenya. The study was grounded on Constructivist learning theory. The researcher adopted a mixed methodology approach to carry out the study, since it had both qualitative and quantitative aspects. Concurrent triangulation design was used. The study was carried out in Nairobi County. The researcher used a questionnaire and an interview schedule to collect views on the effectiveness of ICT on education in universities of Kenya. Secondary data were obtained from books, journals, published and unpublished reports from education centres, libraries, and web-based materials. The collected qualitative data were organized into themes and contents. Descriptive statistics was used to analyse the quantitative data obtained. That specifically mean, standard deviation, and inferential statistical analysis of correlation to test the relationship between the

dependent and the independent variables. The study justified that there was an important positive association between all the measures of ICT and education in universities of Kenya. The results showed that ICT had impact on lecturers and the students. Findings further indicated that lecturers used ICT tools and facilities to lecture. The university management to provide resources to train lecturers on ICT matters.

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INTRODUCTION

Information and Communication Technology (ICT) has been growing faster and having influence in society and daily life. It has been a vital instrument in giving higher education to the people. It is important due the fact that it is minute and separates itself from the bigger centres of production and consumption (UNESCO, 2011). The work of ICT gives various vacancies for proceeding in all life aspects of life and benefits to social services and education (Sealy, 2003). Information and Communications Technology services tend to be small and telecommunication services are limited (Farrell & Wachholz, 2003). Information and Communications Technology has a role to play in developing education (Sealy, 2003). A university in Ireland reported that lecturers who did not develop enough confidence avoided using ICT. Similar case happened in Canada, some lectures admitted they were reluctant ICT users because they were worried, they might get embarrassed since the students knew

more about the technology than they did (Hennessy et al., 2005).

ICT effectiveness in education means technology-based lecturing and learning process that closely relates to the utilization of learning technologies in universities. Since students are familiar with technology and they will learn better within technology-based environment, the issue of ICT in universities specifically in the lecture halls is critical. This is because, the use of technology in education contributes a lot in the pedagogical aspects in which the application of ICT will lead to effective learning with the help and supports from ICT elements and components (Jamieson-Procter et al., 2013).

The main reason for ICT in university education is the following:

- To surround universities with dynamic and innovative learning environments for students to become more motivated and creative;

- To enable students to gain wider range of knowledge and be able to access the internet for developing a global outlook;
- To nurture students with capabilities of processing information more effectively and efficiently; and
- To develop students with attitudes and capability of life-long learning. (Jamieson-Procter et al., 2013).

It is true that the use of ICT has now become an integral part of daily life for a large percentage of people in both developed and developing countries (Kirkwood & Price, 2006). Kozma (2002) believed that ICT is becoming the heart of preparing students and lecturers for participation in the lecturing and learning society. Punie et al., (2006) argued that *“it is difficult and maybe even impossible to imagine future learning environments that are not supported, in one way or another, by ICT”* (p.5).

Information and Communications Technology is not a cure for all educational dilemmas, even though today technologies are obligatory tools (Guri-Rosenblit, 2006; Jung, 2005). Information and Communications Technology when effectively incorporated into lecturing and learning, it ensures interaction between learners and lecturers, thus advancing cognitive skills development (Jones & Cress, 2001; Punie et al., 2006).

According to Ansari and Malik (2013), we need at least seven skills for the 21st century education. They include:

- Rational thinking and problem-solving tactics
- Collaboration across social circles and networks
- Leadership skills and influence
- Adaptability skills
- Efforts and Entrepreneurialism

- Effective interaction and conversational skills
- Examining and Manipulation information skills
- Curiosity and creativity

In the 21st century, ICT is considered as one of the key aspects that provide significant skills to the students such as personal and social responsibility, critical thinking, digital competence, as well as collaboration and communication abilities (Charalambidis, 2014). There is no doubt that due to contemporary emerging technological innovations that appear to transform people’s welfare, prospective lecturers cannot be excluded as they are prepared to work in the future technological environment. On that sense, lecturer’s preparation to adopt and use technology and knowing how that technology can support student learning must become integral skills in every lecturer’s professional repertoire (Kumar et al., 2008).

In our country Kenya, the use of ICT by lecturers in university is a very critical issue. Most of the lecturers within higher learning institutions have no skills to manage workloads especially of their campus-based courses offered in a blended mode.

Statement of the Problem

Due to lack of an Information Technology curriculum within universities, it has brought a greater challenge in harnessing the ICT necessary skills needed by the students. There is substantially less research which focuses on the role which ICT plays in creating and promoting a more interactive educational environment, as part of lecturing and learning. There are no related theories for the adoption of ICT in universities which is totally known to be a higher education centre. Sound models and frameworks are needed to assist the implementation of any ICT-enabled technologies within the higher education sector. The study therefore aimed to fill the identified gaps by evaluating if there was an effect of Information Communication Technology on Education in

Kenyan Universities. In this digital era, many of the young learning students in the universities seem to be ready to embrace technology in their learning while it's not easy to identify similar readiness in the lecturers (Gyamfi, 2016).

Purpose of the Study

The study aimed at evaluating the effect of Information Communication Technology on Education in Kenyan Universities in Nairobi County, Kenya. The objective of the study was:

- To evaluate the effect of Information Communication Technology on Education in Kenyan Universities in Nairobi County, Kenya.

Research Question was:

- What is the effect of Information Communication Technology on education in Kenyan universities in Nairobi County, Kenya?

Justification of the Study

It was expected that the findings of this study would add knowledge and literature provided for by other authors and academicians. The study findings would also benefit the stakeholders in the field of education, especially in policy and leadership in Nairobi County. Lastly, the study evaluated whether Information Communication Technology have effect on education in Kenyan universities in Nairobi County, Kenya.

Significance of the Study

It is considered that the research is potentially of considerable importance, for several reasons: Firstly, it will help to support policy makers in the Ministry of Education in Kenya and lecturers in developing ICT use within universities. Secondly, it will provide an opportunity to compare the views of lecturers, students, and policymakers on ICT use in Kenyan universities. Thirdly, ICT is utilized increasingly in universities and is established in

theoretical and professional practice. Fourthly, in the research literature, there were gaps particularly regarding the use of ICT in universities. The researcher had confident that this study would expand knowledge, fill the gaps, and provide discussion on related topics. It is also an important matter for the decision makers, professionals, and researchers. The findings and conclusions of this study are useful for policy makers at national and international levels.

LITERATURE REVIEW

Is Information Communication Technology able to affect Interactive Learning?

Using ICT effectively can lead to a more positive educational ethos in the lecture halls and in effect a more communicative classroom. Effective use of ICT by the lecturer can offer greater interactivity at both a deep and surface level. We will explore the general use of ICT, but also its impact on interactivity within the classroom Mohammed Kinaanath (2013).

Cox and Marshall (2007) undertook a review of the research and then concluded that ICT had indeed had a positive effect on attainment in National Curriculum subject areas. They qualified this assertion by stating that it was not just the everyday use of ICT as a tool, but the skilful use of ICT by the lecturer, when linked to careful pedagogical strategies enhancing classroom communication. In order to get the best use of ICT, lecturers have to be aware of ICTs range and features as a resource and should be deeply versed with ICT techniques. This conclusion was confirmed by Somekh and Davies (1999) and Sutherland (2005). They assert that the skilful use of ICT by trained practitioners is key to higher attainment. ICT offers a range of key features including speed, automation, capacity, range, provisionally, and interactivity (Beauchamp, 2012: 3).

Information Communication Technology as a tool for Communication

E-mail is a very crucial instrument that can be used to communicate between lecturers and students Mohammed Kinaanath (2013). The widely known characteristics of e-mail are that it is a widely used service on the Internet and an asynchronous form of communication (Hefzallah, 2004). Institutes use e-mail as a channel for student contact and that is why it is adopted in higher education culture (Breen et al., 2001). Hefzallah (2004) stated that “*e-mail may be used to enrich and to enhance the educational experience of students*” (p.191).

Information Communication Technology as means of Pedagogy

Enhancing online learning communities makes more interactive pedagogy (Lai, 2011). Conventional libraries are no longer sites for storing printed materials, and accessing various digital libraries is now the new practice in tertiary institutes (Hefzallah, 2004). These new online collections contain printed works like textbooks, journals, illustrations, maps, photographs, 3D models, animations, and audio files (Blurton, 1999). These technological developments and the rise of online databanks are leading to an increase in learning outside the traditional lecture halls (Hefzallah, 2004). Students and lecturers can use the Internet as a vital informative instrument for research, document searches, and other academic work.

Electronic and digital publications are often more up to date than printed information (Mohammed Kinaanath, 2013). Due to electronic publications, learners and lecturers are increasingly able to access high quality documents at any time, at any place (Bates, 2000b). The World Wide Web (WWW) has the advantage that, through Internet links, lecturers can access websites, and bring materials from these sites into online lectures (Bates, 2000b).

Videoconferencing is particularly popular in multi-campus organizations, such as state university

systems in the USA (Bates, 2000b). A rural campus with few students can be linked to a larger class in the urban area without the need to hire a lecturer (Bates, 2000b). Lai (2011) noted a lack of understanding among higher education institution teachers that why and how technology should be embedded in the traditional pedagogy.

Information Communication Technology as a tool for Electronic Learning

E-Learning is the use of computer system to enhance and support learning at all levels, both formal and non-formal, using an information network (Sife et al., 2007; Tinio, 2000). The principal technology being used for e-learning in the developed world is the Internet (Bates, 2001b). E-learning offers uses for learners of all ages (Mohammed Kinaanath, 2013). Students enjoy its multi-media games and fun activities in acquiring very basic literacy skills; students use its endless information resources for preparing homework, assignments, and examinations (Guri-Rosenblit, 2006).

Mobile Learning

Mobile learning is a new phenomenon and its theoretical basis is currently under development (Kearney et al., 2012). Park (2011) defined mobile learning as “... *the use of mobile or wireless devices for the purpose of learning while on the move*” (p.79). A simple definition was provided by Kearney et al. (2012) as “... *the occurrence of learning: the process of learning mediated by a mobile device*” (p.2).

It is accessible virtually from anywhere (Liu et al., 2003). The concept of anytime and anywhere originated with online education but was revolutionized by mobile learning technologies (Caudill, 2007). The central advantage of learning with mobile technologies is the ability to learn within one’s own context in time and space (Melhuish & Falloon, 2010). Mobile technologies

such as mobile phones, iPods and iPhones, PDAs, and portable net book computers have aroused considerable interest amongst the education sector (Melhuish & Falloon, 2010).

THEORETICAL FRAMEWORK

According to Walsham (1995a), an important question for researchers is the role of theory in their research. The choice of theory is essentially subjective, and Walsham emphasized the freedom of choosing theories with which the researcher is comfortable (Walsham, 2006).

Constructivist learning theory says that learners construct knowledge rather than just passively take in information. As people experience the world and reflect upon those experiences, they build their own representations and incorporate new information into their pre-existing knowledge (schemas). This learning theory contributes to understanding both the construction of and relationship between curricula and events. It also provides direction for research and implementation. Because of the influence of the constructivist learning movement, the theory of constructive learning emphasizes the lecturer's central role in academic curricula and suggests improvement according to the lecturer's needs and interests (Gredler, 2000; Woolfolk, 2006). This theory supports the individual's growth and enables the students to explore their learning potential. The theory has been used to study the impact of ICT on lecturing and learning. Despite the theorists' different definitions of learning, a majority have agreed that learning happens when experience leads to a constant change in the individual's knowledge or manner (Weiten, 2002). What is meant by "experience" in this definition is "the interaction of the person with his or her environment" (Woolfolk, 2006 p.196).

Constructivist Principles

Learning theories based on mannerist and knowledge theories dominated the 20th century.

Their principles have contributed to the enhancement of organized lecturing practice through which the lecturer transmits information and knowledge to students through methods similar to lecturing. Mannerist and knowledge directions placed little emphasis on students' input and their contributions in the lecturing and learning process. Accordingly, students could be deemed by these theories to be passive participants in the learning process (Woolfolk, 2006). In contrast to knowledge and mannerist theories which emphasized the important role played by the lecturer and the organized transfer of content, the constructionist theory emphasized the students' central role in the learning process and acknowledged the students' ability to construct meaning through their learning (Kanuka & Anderson, 1999).

RESEARCH METHODOLOGY AND DESIGN

The researcher used the mixed research method that combines both qualitative and quantitative forms. The chapter explains the different data collecting methods used in this research. Data were obtained through questionnaires, interviews, and email correspondence and were collected at Mount Kenya University. The triangulation of these methods of data collection was designed to increase the validity and reliability of the results. Data collection for quantitative data was through self-administered questionnaires and qualitative data was collected through in-depth interviews. This was primarily done using a questionnaire distributed to the 15 students, 10 lecturers, while structured interviews with senior academic manager and IT consultant/expert completed the data gathering process. These categories of the respondents were purposively selected to participate in giving of the views. Data collected through the questionnaire were subjected to descriptive statistics with the interest to calculate the mean score and standard deviation of which the findings were presented in form of tables. In order to ensure the quality of qualitative research with respect to this study, the researcher explains the measures taken. The chapter

also explains ethical considerations. Ethical principles are concerned with the rights and dignity of the respondents. According to De Vos *et al.* (2011), ethical issues include voluntary participation, confidentiality and anonymity, informed consent, and debriefing of participants.

RESEARCH FINDINGS AND DISCUSSIONS

Descriptive Data Analysis

Table 1: Lecturers’ views on using ICT on education in university

Statement	N	Mean	Std. Dev.
All educational systems within universities should allow the use of ICT and promote interactive learning.	10	3.36	.884
Lecturers have technological knowledge and skills to help students while learning so that they can use ICT as a tool for communication (E-mails)	10	3.15	.906
ICT helps in improving interaction very well between lecturers and students within and even outside the university hence allowing students to present their research work through video conferencing	10	3.38	.982
ICT motivates and increases students’ level of performance and fast tracking of their results	10	3.30	.994
Lecturers are very curious to use ICT and their devices to lecture and support students	10	2.03	1.052
Overall Mean score			3.044

Means: 0 – 1.5 = SD, 1.6 – 3.1 = D, 3.2 – 4.7 = A, Above 4.7 = SA
Key: SD =Strongly Disagree, D =Disagree, N = Neutral, A = Agree, SA =Strongly Agree

Source: Field Data, (2019)

Data presented in the above table indicates that the lecturers have agreed that the ICT has effect on education in Kenyan universities. The study results showed that the overall mean score of effectiveness of ICT on education in Kenyan universities in Nairobi County was 3.044. In regard to the statement ICT helps in improving interaction very well between lecturers and students within and even outside the university hence allowing students to present their research work through video conferencing, it was the highly rated with a mean of 3.38 and SD of 0.982. The logical meaning one could draw was that most prospective students are able to ask their lecturers questions very freely even if they are far in case, they did not understand well while the lesson was going on in class and also allowing students to present their research work through video conferencing. Some aspects such as all educational systems within universities should allow the use of ICT and promote interactive

learning was supported by a mean of 3.36 with a SD of 0.884. Regarding the statement that lecturers have technological knowledge and skills to help students while learning so that they can use ICT as a tool for communication (E-mails), a mean of 3.15 and a SD of 0.906 were obtained. Based on the argument that ICT motivates and increases student’s level of performance and fast tracking of their results hence meeting academic standards, a mean of 3.30 and a SD of 0.994 were obtained. Contrary, there was an aspect that appeared to be rejected. It is about the statement that lecturers are very curious to use ICT and their devices to lecture and support students which had a mean of 2.03 and SD of 1.052. This is a clear indication that not all lecturers are curious to adopt the use of ICT devices in the learning environment to lecture and support students. This is because others may be lacking skills required in using of the technological devices.

Table 2: Students’ perspectives on using ICT on education in university

Statement	N	Mean	Std. Dev.
My undergraduate programme lecturers created awareness of ICT to support my learning hence improving my performance and creativity.	15	3.12	.881
I expect to collaborate with fellow students and even my lecturers through online platforms	15	2.01	1.029
I gained enough skills for being in ICT class which has made my postgraduate studies very easy especially in research and during defences	15	3.28	.902
I am ready to encourage my fellow students to continue being engaged with ICT even after completing university education	15	3.18	.914
Overall Mean score			2.8975

Means: 0 – 1.5 = **SD**, 1.6 – 3.1 = **D**, 3.2 – 4.7 = **A**, Above 4.7 = **SA**

Key: **SD** =Strongly Disagree, **D** =Disagree, **N** = Neutral, **A** = Agree, **SA** =Strongly Agree

Source: Field Data, (2019)

Data presented in the above table indicates that the students have agreed that the ICT has effect on education in Kenyan universities. The study results showed that the overall mean score of effectiveness of ICT on education in Kenyan universities in Nairobi County was 2.8975. In regard to this statement, ‘I gained sufficient skills for being in ICT class which has made my postgraduate studies very easy especially in research and during defences’, was the highly rated with a mean of 3.28 and SD of 0.881. The logical meaning one could draw was that most prospective students who had done their undergraduate studies under ICT influence are having easy progress of their studies at postgraduate level. An aspect such as ‘my undergraduate programme lecturers created awareness of ICT to support my learning hence improving my performance and creativity’ was supported by a mean of 3.12 with a SD of 0.881. Based on the argument the statement that ‘I am ready to encourage my fellow students to continue being engaged with ICT even after completing university education,’ a mean of 3.18 and a SD of 0.914 were obtained. Contrary, there was an aspect that appeared to be rejected. It is about the statement that ‘I expect to collaborate with fellow students and even my lecturers through online platforms’ which had a mean of 2.01 and SD of 1.029. This is a clear indication that not all students are willing to collaborate with his fellow students and even the lecturers on the platform.

Thematic Analysis of Qualitative Data

When IT expert within the university was approached on the effectiveness of ICT on education in Kenyan universities, he gave his views as follows:

“In terms of ICT facilities, I would consider the Mount Kenya University is far ahead compared to other countries. When we compare with the neighbouring universities, suppose if we look into the quantity and quality of computers and technologies used in the offices, I have to say the Mount Kenya University is far ahead. But the difference is how we are using these ICT technological facilities and they are not utilized. Now we face the situation of having the required ICT facilities but lacking how we can utilize these ICT facilities in an innovative fashion” (ICT expert).

A lecturer said that

“The number of students at Mount Kenya University is very big and yet we have limited resources in regard to ICT hence very difficult to provide expensive ICT technologies for each and every student”.

A student said that

“The students are having these ICT facilities, but I think the biggest problem is that lecturers [are]

not ICT savvy and [are] uneducated in delivering. The lecturers do not have the required standard or do not have the confidence in using the ICT resources”.

CONCLUSIONS AND RECOMMENDATIONS

The study results acknowledge several trends regarding effectiveness of information communication technology on education in Kenyan universities. The study findings showed that there was an important positive association between all the measures of ICT and education in Kenyan universities. Lecturers disagreed with the statement that lecturers are very curious to use ICT and their devices to lecture and support students. The study concluded that there was an effect of information communication technology on education in Kenyan universities in Nairobi County, Kenya. In the 21st century, students, parents, and lecturers are sensitive looking for education institutions that provide quality education mostly in regard to ICT. It is hoped that this article will trigger technology specialists, experts, consultants, researchers, curriculum practitioners and lecturers to reflect on how effectively ICT can be used in universities education to enhance the acquisition of the necessary skills in this world of market.

Recommendations for Practice

The study found out that the statement lecturers are very curious to use ICT and their devices to lecture and support students had the lowest mean. The study recommends that:

- The University administration should take steps to train more of the lecturers on the use of ICT so that they can have knowledge and be able to use ICT appropriately. Lecturers should not be afraid to learn on computer hardware and software.

- Students to be encouraged to undertake scientific and technological courses so that the number of future lectures may increase in this field.
- National policies to be put in place to dissolve the existing barriers to digital education access.
- State must also take appropriate action and provide the good infrastructure to enable technology use by the universities.

Recommendations for Further Studies

The study recommended that the following further areas of study be undertaken;

- The study concentrated on Nairobi County therefore, the generalization of results to other counties needs to be done with caution. The study recommends a similar study to be done in other Counties.
- This study did suggest that further studies can be done on the same County but introducing the elements of moderating variables.

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